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UNITED STATES ARMY
HEALTH CARE STUDIES AND
CLINICAL INVESTIGATION ACTIVITY

DEVELOPMENT OF A POST ANESTHESIA
CARE UNIT NURSING PATIENT CLASSIFICATION
SYSTEM: THE INDIRECT CARE COMPONENT

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<p>The purpose of this study was to determine the Indirect Care time (including Nonproductive time) expressed as a proportion of Available time; this eventually will be combined with Direct Care time and Unavailable for Care time to determine nursing requirements consistent with currently accepted nurse staffing standards methodology. To determine the Indirect Care and Nonproductive proportions for the Army Post Anesthesia Care Unit (PACU) nursing units, a stratified work sampling design was used. Using weighted stratified sampling, the required sample size of nine sites was selected from the low, medium, and high workload strata proportionate to the number of sites from the total universe that occurred within each stratum. Using 5% accuracy (95% confidence interval length) and .65 as an approximation of the Indirect Care time proportion, it was estimated that at least 364 data point per site were required. Actual sample resulted in an accuracy of at least 4.3%. Data collection was distributed over a work cycle for PACU, defined as one week of the measured unit's hours of operation. A minimum of one observation session per hour and a maximum of</p>					
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six observation sessions per hour were scheduled to insure representative sampling of nursing activities throughout the day. Upon analysis of the collected data, it was found that each of the workload stratum-specific proportions was within 3% of the overall combined Indirect Care and Nonproductive time proportions of 76.8%. Using the criteria of accuracy and ease of use, the findings from this study recommend that a combined Indirect Care and Nonproductive proportion of 76.8% (based on Available time and with the head nurse, wardmaster, and ward clerk positions considered as directed requirements) be used to develop the PACU staffing standard.

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Introduction

Within the tri-service health care arena, staffing methodology has evolved from subjective analysis by manpower experts (e.g., manpower teams) to more objective staffing standards that quantitatively express manpower requirements as a function of variable workload. To determine nursing requirements, the Workload Management System for Nursing (WMSN) was accepted as the basis for a U.S. Army staffing standard in December 1986. A sine qua non for selecting a standard for determining nurse staffing was that it had to recognize the variation in patient acuity and account for the number of patients in acuity classification categories (JCAHO, 1990; USAMARDA, 1986).

Background

Within the inpatient care area, staffing standards derived from the WMSN exist for medical-surgical, critical care, pediatric, psychiatric, newborn, and OB/GYN nursing units. Notably absent are staffing standards for the Post Anesthesia Care Units (PACUs). Using manpower tables, PACU staffing is based upon number of patients. Using this approach, nursing care requirements are assumed to be the same for each PACU patient, thereby imprecisely predicting the true nursing care requirements.

In response to the absence of a patient acuity-based nurse staffing standard, the Army Medical Department (AMEDD) Study Board charged U.S. Army Health Care Studies and Clinical

Investigation Activity (HCSCIA) in 1986 to develop a patient classification system for PACU. As of September 1988, the Office of the Assistant Secretary of Defense, Health Affairs [(OASD(HA))] expanded the focus of this HCSCIA study to the Tri-service arena.

Purpose

In concert with currently accepted nurse staffing standards methodology, determination of nursing requirements is based upon Direct Care time expressed in hours as well as both Indirect Care time, expressed as a proportion of Available time, and Unavailable for Care time, expressed as a proportion of total hours. A measurement method exists for determining the PACU Direct Care hours, and the Unavailable for Care time proportion is already known, as established by manpower guidance. Only the assessment of the Indirect Care time proportion (including the Nonproductive time--see discussion under Nomenclature Issues) is required to develop a staffing standard for PACU. Thus, the purpose of this study is to identify the Indirect Care time proportion (including Nonproductive time) for PACU.

Nomenclature Issues

Original Indirect Study Compared to Subsequent Manpower Regulations

Since the original indirect nursing care study (Misener, Frelin, & Twist, 1983), substantive regulatory changes have occurred in the manpower arena affecting the way critical terms

are defined; these changes particularly affect the use of the terms Unavailable for Care and Nonproductive time. Misener et al. (1983) defined Unavailable for Care time as personal activities along with other activities that resulted in a staff member's absence from the unit for less than eight hours. Since that study, manpower regulations have explicitly defined Unavailable for Care time by the term Nonavailable time which encompasses six specific broad activities. None of Misener et al.'s personal time, and only some of the off unit activities, are included in this new manpower-driven definition of Nonavailable time. Misener et al.'s personal time more closely matches the manpower definition of Nonproductive time. Within Misener et al.'s nine subcategories of Indirect Care, the subcategory labelled as Wait is now defined as part of Nonproductive time, namely standby time, by manpower regulations and is NOT considered part of Indirect time. Finally, most of Misener et al.'s Indirect Care subcategory definitions are different from standard manpower definitions (Appendix A).

Present Study

With knowledge of Misener et al.'s (1983) definitions and in light of the impact of manpower regulatory changes, the present study defined terms to insure consistency with Misener et al.'s definitions wherever feasible. Manpower definitions were adopted where these terms were congruent with WMSN staffing standards and allowed accurate measurement of nursing activities (Appendices B and C). Misener et al.'s definition of Direct Care was

subdivided to allow measurement of nonnursing functions and to determine their effect on staffing. The original indirect subcategory of Medication, Supplies, and Equipment was relabeled to more accurately capture nursing activities and to move supply activities to a separate subcategory, thus facilitating measurement of nonnursing functions.

Terms accepted from the manpower arena included the definition of Nonavailable time (relabeled as Unavailable for Care) and Nonproductive time. The Unavailable for Care time definition was expanded to include continuing education and readiness training. Currently, OASD(HA) is evaluating the impact of education and readiness training upon manpower staffing standards for nursing. In discussions with OASD(HA), it was agreed that using a work sampling technique would potentially undersample the time proportion associated with continuing education and readiness training. This undersampling might occur because the data collection period was only one week in length and many of the educational or readiness activities occur monthly or annually. Therefore, nursing activities associated with continuing education or readiness training were categorized under the Unavailable for Care category with later readjustment to be made depending upon OASD(HA) direction. Because the Indirect Care and Nonproductive proportions were determined based upon Available time only, categorizing educational and readiness activities under Unavailable for Care category prevented "double-counting" these activities.

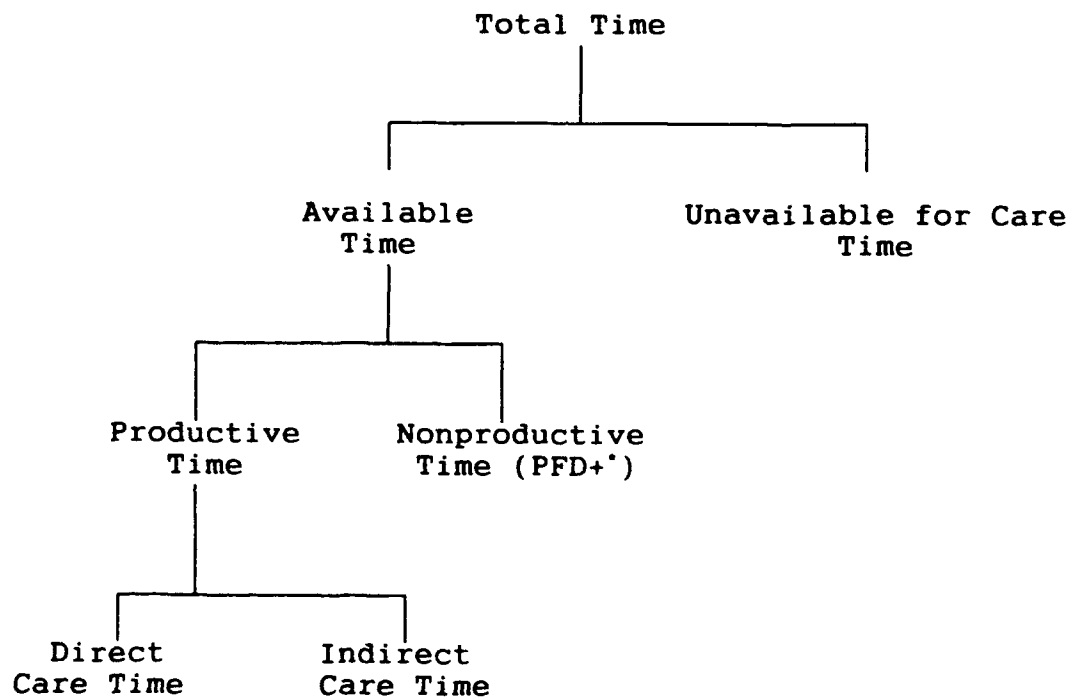
Also, the manpower definition of Nonproductive time was accepted, but relabelled as Personal, Fatigue, and Delay Plus (PFD+) on the data collection forms. This relabelling was done to enhance acceptance of data collectors on the nursing units, avoiding the potentially negative connotations from the term nonproductive despite its legitimacy. The manpower definitions for indirect categories were not accepted for the present study because these definitions were not compatible with current nurse staffing standards methodology.

Organizing Framework

To develop a staffing standard consistent with the current WMSN standards, times associated with various components of Total time must be quantified. Congruent with manpower approaches, Figure 1 identifies these components and demonstrates their relationship to Total time as used in the present study.

As noted in Figure 1, development of a staffing standard using the WMSN method dictates that times be determined for Unavailable for Care time, Nonproductive time, Indirect Care time and Direct Care time. Unavailable for Care (Nonavailable) time is already known. The exact Manhour Availability Factor (MAF) as prescribed by regulations (Army, 1988; Air Force, 1988; Navy, 1988) will be used to determine the Unavailable for Care time (i.e., total work time as mandated by Congress minus Available time). Additionally, a method for determining PACU nursing

Figure 1. Components of total time and their relationships



*Personal, Fatigue, and Delay Plus

Direct Care time has been developed (Carty, Rea, & Jennings, 1991).

Thus, both the Indirect Care time and Nonproductive time remain to be determined for PACU. While in concert with the civilian health care sector (Freitas, Helmer, & Cousins, 1987; Johnson, 1984; Vanputte, Sovie, Tarcinale, & Stunden, 1985), the accepted Department of Defense (DOD) nursing guides (USAMARDA, 1986), and the corporate world (Ehrman, 1987; Medicus, 1988), the Indirect Care component in this study is defined differently than manpower regulations (Army, 1988; Air Force, 1988; Navy, 1988). This modification is necessary to capture workload within a service sector in which the basic unit of service, the patient, varies.

Research Questions/Definitions

To identify the required time proportions, the following research questions were asked:

1. What are the Indirect Care and Nonproductive proportions of Available time for PACU units?
2. Do these Indirect Care and Nonproductive proportions of Available time differ by workload strata?

Operational definitions of terms critical to this indirect study are found in Appendix D.

Assumptions

For the purposes of this study, the following assumptions were made:

1. Individual nursing staff members' behaviors are distributed similarly across site workload strata and are random with respect to time during the observation period.
2. The Indirect Care proportion will be similar between CONUS and OCONUS facilities.
3. While Unavailable for Care proportion may be different for CONUS and OCONUS, the proportion or number of hours designated as Unavailable for Care is determined by regulation. Within the current nurse staffing guides, CONUS and OCONUS Unavailable for Care time differences are accounted for by use of a different constant or "a" value in the formula $Y=a + b_1x_1$ (USAMARDA, 1986).
4. Direct Care times are similar across services (e.g., similar time is needed to start an intravenous line in the Army as in the Air Force and Navy).

Methodology

Overview

To determine the Indirect Care and Nonproductive proportions for the Army PACU nursing units, a stratified work sampling study

was conducted. Use of work sampling assumes that activities observed at random points in time will demonstrate similar distributions of occurrence as continuously observed behaviors. Using representative sites stratified by workload, a Work Sampling Data Collection Form was designed and used to classify nursing staff behaviors into appropriate categories (Appendix E). Additionally, an Interview Guide was developed to obtain information regarding the existence of supplemental support services that might influence the measured Indirect Care or Nonproductive proportions. Finally, information regarding normalcy of workload during the observation period was obtained.

Procedures

Site Sampling Criteria

To be considered for inclusion in the study, a PACU unit had to have its own dedicated staffing. That is, the unit's staff was not simultaneously responsible for nursing care in another nursing area, e.g., intensive care or operating room. For those PACU units reporting dedicated staff, additional information related to workload, organizational characteristics, and staffing was obtained. Furthermore, only CONUS locations were considered as data collection sites due to cost constraints and recognition that the major difference between CONUS and OCONUS sites is expected to be within the Unavailable for Care category.

Site Sample Size and Selection

The total number of sites required to be sampled was guided by Army Regulation 570-5 (1988), Air Force Regulation 25-5 (1988) and the Navy Shores Manpower Requirement Handbook (1988). Based upon the universe of separately staffed PACU units, univariate plots of PACU Tri-service workload were analyzed for cutpoints to classify facilities for each service into low, medium, and high workload strata (Figure 2). Cutpoints that could be used across services were found at 65,000 and 125,000 minutes of service using quarterly averages. Using these cutpoints, all separately staffed PACU units were classified into an appropriate workload strata (Table 1).

Using weighted stratified sampling, the required sample size was then selected from each stratum based upon the proportion of sites from the total universe that occurred within that stratum (Table 2). For example, the Army low PACU workload stratum represented 63% of the Army PACU identified population (20 low workload sites/32 total sites); therefore, 63% of the required sample sites were selected from the low stratum. Specifically, 5 sites within the low stratum were selected for the study, (i.e., 63% of 9 required sample sites per regulatory guidelines or 5 sites). In instances where rounding was required, decisions were made based upon representativeness of the service's overall workload.

The actual sites selected for this study are found in Table 3. To the greatest extent possible, sites that met criteria for

Figure 2.

Tri-Service PACU Workload with Strata Cutpoints

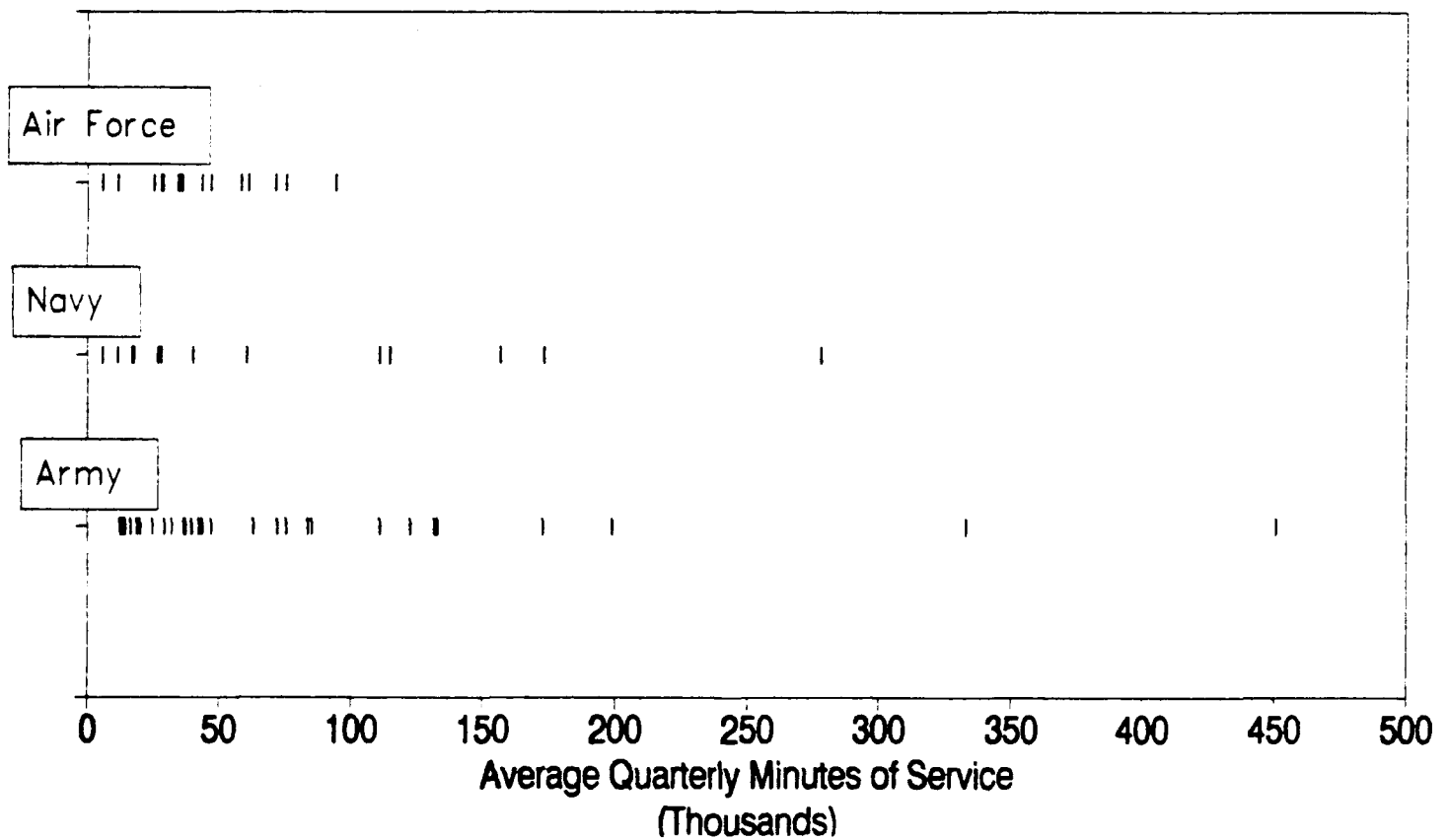


Table 1.

Population of Army PACU sites, by workload strata
(Numbers are based on average quarterly minutes of service.)

Low (n=20) (0-65,000)	Medium (n=6) (65,000-125,000)	High (n=6) (>125,000)
Ft. Belvoir	EAMC	BAMC
Ft. Campbell	FAMC	LAMC
Ft. Devens	WBAMC	MAMC
Ft. Eustis	Ft. Benning	TAMC
Ft. Huachuca	Ft. Carson	WRAMC
Ft. Jackson	Ft. Hood	Ft. Bragg
Ft. Knox		
Ft. Leavenworth		
Ft. Lee		
Ft. Leonard Wood		
Ft. McClellan		
Ft. Meade		
Ft. Ord		
Ft. Polk		
Redstone Arsenal		
Ft. Riley		
Ft. Rucker		
Ft. Stewart		
Ft. Wainwright		
Westpoint		

Note. The following acronyms are used:

BAMC--Brooke Army Medical Center
EAMC--Eisenhower Army Medical Center
FAMC--Fitzsimmons Army Medical Center
MAMC--Madigan Army Medical Center
TAMC--Tripler Army Medical Center
WBAMC--William Beaumont Army Medical Center
WRAMC--Walter Reed Army Medical Center

Table 2.

Calculation of number of sites to be selected for Army PACU study, by workload strata

	Low (n=20)	Medium (n=6)	High (n=6)
Proportion of the identified population to be selected	.63	.19	.19
Number of sites selected	5	2	2

Table 3.

Sampled Army PACU sites, by workload strata

Low	Medium	High
Ft. Knox	Ft. Benning	MAMC
Ft. Leonard Wood	Ft. Hood	WRAMC
Ft. Ord		
Ft. Polk		
Ft. Rucker		

Note. The following acronyms are used:

BAMC--Brooke Army Medical Center
 EAMC--Eisenhower Army Medical Center
 FAMC--Fitzsimmons Army Medical Center
 MAMC--Madigan Army Medical Center
 TAMC--Tripler Army Medical Center
 WBAMC--William Beaumont Army Medical Center
 WRAMC--Walter Reed Army Medical Center

both this study as well as a similar study of Labor and Delivery units (L&D) (Rea, Jennings, Carty, & Seipp, 1991) were chosen to enhance efficiency both in terms of time and cost.

Data Collection Subcategories

Although the focus of this study was to determine the Indirect Care and Nonproductive proportions for PACU, data were collected describing Direct Care, and Unavailable for Care, as well as Indirect Care and Nonproductive information. Although only the Available times were used to determine Indirect Care and Nonproductive proportions, collection of data for all components of Total time was necessary both to determine the required proportions and to insure data completeness and accuracy. Within the Direct Care and Indirect Care categories, subcategories were designated on the Work Sampling Data Collection form to classify observed activities of PACU nursing personnel. Recalling the modifications as discussed under Nomenclature Issues, a total of 12 data collection subcategories were established: 2 Direct Care, 1 Unavailable for Care, 1 Nonproductive (PFD+) and 8 Indirect Care.

Required Number of Observations

The required number of observations was determined by both the desired level of accuracy and the proportion of occurrence for the largest category, which in Misener et al.'s (1983) study was the Indirect Care category. Although Army Regulation 570-5 (1988) required the use of a 3% absolute accuracy (97% confidence interval length), that level was an unnecessarily strict

constraint in this study. Sampling to obtain a 3% absolute accuracy would have been extremely costly as this would have required collection of at least 1011 usable data points at each of the nine sites.

This study's desired proportions could be obtained using a less stringent accuracy level while still yielding sufficient precision to avoid negative impact on the calculated staffing. For example, by using a 5% absolute accuracy with .65 Indirect Care proportion, a potential staffing difference of .52 fulltime equivalent (FTE) does not occur until Direct Care hours equal 3000 hours per month for a unit with 34 nursing personnel. Furthermore, even the .52 FTE difference is found only if the true Indirect Care proportion is at the extreme upper or lower end of the confidence bands (Appendix F).

In addition to accuracy, the proportion of the largest category had to be estimated. For this study, the Indirect Care category was expected to represent the highest proportion of time based upon Misener et al.'s (1983) study. Using 5% accuracy (95% confidence interval length) and .65 as an approximation of the largest proportion to be estimated the required number of observations was calculated as follows:

$$n = \frac{4(p)(1-p)}{a^2} = \frac{4 * 0.65 * 0.35}{0.05 * 0.05} = 364$$

where p = largest proportion and a = stated accuracy level. To insure that 364 usable data points were obtained, work sampling

activities were scheduled to collect 600 observations at each site.

Work Cycle

For the purpose of this study, a work cycle for PACU was defined as one week of the measured unit's hours of operations. Representing the population, the PACUs selected for this study were not all operational 24 hours/day x 7 days/week. Two PACUs were operational 24 hours/day x 7 days/week, 4 PACUs were open 10 hours/day during the duty week, with 2 units open for 9 hours and 1 unit open for 8 hours during this duty timeframe.

Prior to actual data collection, the selected sites were surveyed by telephone to determine the existence of outside factors that would cause workload to be nonrepresentative during the planned observation period (e.g., surgeons attending a conference, accreditation surveys, mobilization for field exercises).

Reliability and Validity

Instrument Validity. With the modification of Misener et al.'s (1983) data collection tool, and considering that nursing practice might have changed since the initial use of the tool, it was necessary to examine the validity of the Work Sampling Data Collection Form proposed for this study. The tool was reviewed by three nurse researchers knowledgeable in work sampling techniques and patient classification instrument development. The tool was also reviewed by nurses from each of the services and from OASD(HA) to insure completeness of the form (e.g., all

nursing activities could be categorized) and compatibility with service-specific requirements. Finally, the instrument was pilot tested at the first data collection site (BAMC). During this pilot test, all nursing activities could be categorized using the instrument; however, data collection instructions were further clarified for the data collectors (e.g., how to categorize a staff member who is pulled away from the unit).

Interrater Reliability and Accuracy. Considering the number of Army data collectors (N=9), it was important to verify understanding and consistent use of the data collection form. A three-day training seminar was conducted for the data collectors prior to the start of data collection (Appendix G). During this seminar, didactic information was presented and practical exercises were used to modify, reinforce, and clarify prior manpower knowledge. Additionally, a four-hour data collection exercise was conducted at an Army medical treatment facility using both L&D and PACU units to gain experience in a real-world data collection situation. Finally, a training videotape was used to assess interrater reliability. Each data collector viewed 12 observation sessions with 4 nursing staff in each session, thereby creating 48 data coding opportunities. A criterion of 90% accuracy was established to be a data collector.

Due to the length of the data collection efforts (January 90-April 90), interrater reliability was reassessed midway through the data collection time period. Again, 90% accuracy by

each data collector had to be achieved for them to continue with the study.

Data Collection Plan

After gaining official entree through U.S. Army Health Services Command (HSC) to a given medical treatment facility, a nurse researcher from HCSCIA accompanied the data collection team to brief the PACU nursing staff as well as any interested hospital administrators regarding the study's purpose and nursing staff impact. The nurse researcher remained on-site for two days to assist the data collectors by clarifying the use of the data collection forms and to respond to nursing staff issues or concerns.

Work Sampling Data Collection Form. Prior to data collection, the number of observation sessions as well as random start times were established for each site. The number of observation sessions was determined as follows:

1. $(\text{Total number of data points}) / (\text{number of days in study})$
= number of data points per day.
2. $(\text{Number of data points per day}) / (\text{estimated average staffing})$ = number of observation sessions per day.
3. $(\text{Number of observation sessions per day}) / (\text{hours of unit's operation per day})$ = number of observation sessions per hour.

It was believed that the distribution of nursing activities was likely to vary systematically across hours of the day (e.g., activities could be different on the night shift as compared to

the day shift). Thus, data were collected at least once during each hour of the day even when the required number of data points could have been obtained with fewer observation sessions. Thus, a minimum of one observation session per hour (to allow sampling during all the hours of operation) and a maximum of six observation sessions per hour (to preclude continuous observation) were scheduled to insure representative sampling of nursing activities throughout the day (Sven & Ary, 1989).

When only one observation session was required per hour, random observation times were selected within the one-hour strata. These random times were predetermined prior to the data collection team's arrival at each site.

If more than one observation session per hour was necessary to obtain the required number of observations per day, a systematic random sampling technique was used to determine random time within blocks (Cochran, 1977; Scheaffer, Mendenhall, & Ott, 1986). Times were predetermined prior to data collection with a new set of times systematically selected for each day of the work cycle. The times were selected according to the following algorithm:

1. $(60 \text{ minutes per hour}) / (\text{number of observation sessions per hour}) = \text{time interval in minutes between observation sessions (adjusted to include a sufficient time interval to allow travel by the data collector between units being used in concurrent studies.)}$

2. Start time within the first hour was determined from a random numbers table.
3. Once a random start time was identified, subsequent observation session's start times were determined by the calculated time interval between sessions.
4. A new random start time was selected for each day of the data collection period, and the calculated time interval determined subsequent observation session times.

After the number of observation sessions and the data collection times were established, a data collection form was initiated for each hour of the collection period (Appendix E). At the end of each observation session, the data collector reviewed the form for completeness and accuracy.

Interview Guide. An interview guide was created to obtain information about supplemental support staff. Specifically, information was collected from the head nurse regarding housekeeping support, supply support, patient support (lab, EKG, respiratory therapy, meals), and transport support.

Workload Information. As required by regulation (Army, 1988; Air Force, 1988; Navy, 1988), information was collected regarding normalcy of the workload during the data collection period. At the end of the data collection period, the head nurse was contacted by telephone by the nurse researcher and queried about the workload levels and about the occurrence of any unusual events during the data collection.

Human Subjects' Rights

This study was reviewed by the Clinical Investigation Activity staff of HCSCIA for the protection of subjects' human rights. This study was deemed exempt from further review.

Data Analysis

This study was designed to provide precise and accurate measures of the proportions of time spent by nursing staff in various care categories. Thus, the fundamental questions in this study required appropriate use of descriptive statistics rather than any type of hypothesis testing methods. The measure of proportions of time in various care categories was provided by direct computations of proportions overall and within specified strata of interest. To assess the question of possible workload strata (i.e., low, medium, high) differences in time configurations, appropriate categorical statistics such as chi-square analysis were done on cross-classified data.

Comparisons to required data accuracy standards were done directly after computations of accuracy overall and by site as previously described. Finally, data from the Interview Guide and workload information were assessed using frequencies to derive descriptions regarding degree of support services and normalcy of workload.

Results

Preliminary Analyses

Interrater Reliability

Interrater reliability was assessed through rater accuracy as described in the procedures. For the initial test using the videotape scenarios, a score of 43 correct of 48 possible or 90% was predetermined to be the required passing score. Accuracy was the primary criterion because assessing reliability only in terms of consistency was unacceptable as consistent wrong answers could also give high interrater reliability scores. Of the nine data collectors, eight scored 90% or higher with a mean score of 45 (94%). When retested after further study, the ninth data collector scored 96% (46/48 correct answers). Examination of the tests revealed no consistent pattern of missed answers. By default, this high rate of accuracy also insured high interrater reliability as assessed by agreement (averaging at least 88% even if raters had no missing answers in common).

A recheck of rater accuracy was done mid-study. Of the nine data collectors, six scored 90% or higher with a mean score of 46 (96%). When retested, the three remaining data collectors scored a 47.6 average. Again, no consistent pattern of missed answers was found. This high accuracy rate again insured high interrater reliability. Thus, mid-study reassessment of interrater reliability verified continued interrater accuracy and

consistency for the second half of the data collection activities.

Data Checking

Data forms were checked for completeness by the nurse researchers prior to data entry. Data were then entered and verified using double key entry. Additional randomly sampled manual verification following key entry showed no errors in the data base.

Descriptive Analyses

Total versus Available Time

The time that was used as the base for computing proportions is Available time as described earlier and depicted in Figure 1. That is, in the following discussions and tables, Total time refers to all observations, Available time refers to Total time minus the Unavailable for Care time. Available time is further divided into Direct Care time, Indirect Care time, and Nonproductive time.

Observations Collected

Total time and Available time observation counts and percentages are given for all sites and for sites stratified by low, medium, and high workload (Table 4). A total of 6174 usable observations were collected, with 5798 being Available time. Details of observations by site are given in Appendix H. Time represented by observations collected for all nursing staff types is classified by the care categories in Table 5. For example,

Table 4.

Number of observations by workload strata, total time and available time

Observations	Workload strata			Total
	Low	Medium	High	
Total number	2998	1701	1475	6174
% of total time*	48.6	27.5	23.9	100.0
Total no. in available time	2809	1562	1426	5797
% of available time*	48.5	26.9	24.6	100.0

* These are the percentages of observations (total or available) contributed by each workload strata to the overall study observations.

Table 5.

Number of observations by care category, total time and available time (includes all nursing staff types)

Care category	Observations - Total time		Observations - Available time	
	Number	Percent	Number	Percent
DIRECT CARE	1266	20.5	1266	21.8
Direct nursing	1239	20.1	1239	21.4
Direct non-nursing	27	0.4	27	0.5
OTHER				
Unavailable	322	5.2	0	0.0
Non-productive	1410	22.8	1410	24.3
INDIRECT CARE	3121	50.6	3121	53.8
Administration	463	7.5	463	8.0
Communication	421	6.8	421	7.3
Conference	34	0.6	34	0.6
Documentation	858	13.9	858	14.8
Environmental	234	3.8	234	4.0
Patient support	393	6.4	393	6.8
Supplies	58	0.9	58	1.0
Travel	660	10.7	660	11.4
Pulled off	40	0.6	0	0.0
Missing data	15	0.2	0	0.0
Total	6174	100.0	5797	100.0

direct nursing care accounted for 20.5% of Total time, and 21.8% of Available time. Reflecting the definition of Available time, the Unavailable for Care category contributes 5.2% of the Total time and 0% of Available time. Nonproductive time represents 22.8% of Total time and 24.3% of Available time. The Indirect Care category accounted for 50.6% of Total time and 53.8% of Available time.

Adequacy of the collected sample size can be assessed by calculating the absolute accuracy using the formula discussed in the Required Number of Observations section found earlier in this report. Computations were done separately for each site within workload strata (Table 6). Absolute accuracy ranged from 3.4% to 4.3% by site; all sites were within the 5% accuracy (and minimal sample size of 364) agreed upon as the requirement for this study. This demonstrates that the number of sampled observations from each site was more than adequate for the requirements of this study.

Observations by Nursing Staff Type

The contribution of each type of nursing staff to the overall observations is shown by Total time and by Available time (Table 7). There were no professional students counted on any of the units during the data collection periods. The proportions for each nursing staff type are virtually the same for Available time as for Total time, with the primary differences being a decrease of 0.7% in nursing assistants and paraprofessional

Table 6.

Absolute accuracy of time proportions, by site (based on available time)

	Low Workload					Medium Workload		High Workload	
	Ft Knox	Ft Leonard Wood	Ft Ord	Ft Polk	Ft Rucker	Ft Benning	Ft Hood	MAMC	WRAMC
Indirect %	56.8	56.8	56.8	56.8	56.8	51.3	51.3	59.3	59.3
n	531	520	567	629	561	707	855	732	694
Accuracy(%±)	4.3	4.3	4.2	4.0	4.2	3.8	3.4	3.6	3.7

Note. All sites have accuracy percentages within the study design standard of 5% or less.

Table 7.

Number of observations by nursing staff type, total time and available time

Nursing staff type	Observations - Total time		Observations - Available time	
	Number	Percent	Number	Percent
Head nurse	1374	22.3	1344	23.2
Wardmaster	630	10.2	608	10.5
RN	1019	16.5	969	16.7
LPN	1201	19.5	1130	19.5
Nursing asst	1449	23.5	1321	22.8
Ward clerk	84	1.4	84	1.4
Prof student	0	0.0	0	0.0
Paraprof. student	417	6.8	341	5.9
Total	6174	100.0	5797	100.0

students and increases of 0.3% in the wardmaster and 0.2% in RNs. Details of Available time stratified by site workload show that as workload increases the proportion of head nurse observations decrease whereas the proportion of RN observations increase (Table 8). Also, compared to the low workload stratum, the proportion of LPN observations decreases in the medium workload stratum and increases in the high workload stratum. In contrast, the proportion of nursing assistant observations increases in the medium workload stratum and decrease in high workload stratum. Finally, ward clerks were found only at sites with high workload.

Detailed Analyses

The time base used to calculate the proportions of Indirect Care and Nonproductive time was Available time. As previously discussed, the use of Available time insured consistency with manpower methods in that the Manpower Availability Factor could be used as the divisor in any resultant staffing standard equation. Student observations were also eliminated from computations of proportions because they appeared to be nonrepresentative of the nursing staff care categories. For example, the Nonproductive percentage for students was 35%, compared to about 24% overall (Appendix I). This high Nonproductive time is thought to be due to the fact that students may have a higher "standby" time when they are available to work, but are unable to perform required nursing tasks due to their

Table 8.

Number of observations by nursing staff type in workload strata, available time

Nursing staff type	Observations by workload strata					
	<u>Low</u>		<u>Medium</u>		<u>High</u>	
	Number	Percent	Number	Percent	Number	Percent
Head nurse	1003	35.7	245	15.7	96	6.6
Wardmaster	279	9.9	237	15.2	92	6.5
RN	178	6.3	190	12.2	601	42.2
LPN	508	18.1	202	12.9	420	29.5
Nursing Assistant	664	23.6	572	36.6	85	6.0
Ward clerk						
Prof student	0	0.0	0	0.0	0	0.0
Paraprof student	177	6.3	116	7.4	48	3.4
Total	2809	100.0	1562	100.0	1426	100.0

inexperience. However, the effect students have on other nursing staff's time was captured because data were collected on nursing staff who were involved with students.

Percentages of Time by Care Category

The overall percentages of Available time (students eliminated) represented Direct Care, Indirect Care, and Nonproductive times are shown in Table 9. Additionally, percentages are shown with the head nurses and wardmasters eliminated, consistent with formulae in the present WMSN, and also with head nurses, wardmasters, and ward clerks eliminated. Indirect Care and Nonproductive times accounted for 75% to 80%, depending on the nursing staff mix, with Indirect Care alone accounting for 51% to 55%.

Comparison of Workload Strata

The percentages of Available time for the previously described nursing staff type configurations are also given for Direct, Indirect, and Nonproductive times by workload strata in Table 9. The differences by strata in the percentages for all nursing staff types are accounted for primarily by differences in the proportion of Direct Care Time. The low workload sites have the largest proportion of Direct Care at 25% (all staffing configurations), with correspondingly lower Nonproductive time proportions.

When head nurses, wardmasters, and ward clerks are considered as directed requirements (fixed FTEs) and removed from the analyses, there remains a statistically significant

Table 9.

Overall percentages of available time by workload strata, in various nursing staff configurations (students excluded in all cases)

Care category	Percentage of available time by workload strata			
	Overall	Low	Medium	High
<u>All nursing staff</u>				
Direct	21.55	24.62	17.98	19.45
Indirect	54.78	51.25	59.27	56.82
Nonproductive	23.66	24.13	22.75	23.73
<u>Nursing staff excluding head nurses and wardmasters</u>				
Direct	22.79	25.20	20.23	20.08
Indirect	52.23	51.04	52.28	54.54
Nonproductive	24.98	23.76	27.49	25.38
<u>Nursing staff excluding head nurses, wardmasters, and ward clerks</u>				
Direct	23.22	25.20	20.23	21.61
Indirect	51.82	51.04	52.28	53.07
Nonproductive	24.96	23.76	27.49	25.32

Note. All staff configurations show statistically significant differences in proportions across strata. Chi-square statistics (top to bottom) are: $\chi^2(4)=40.0$, $p<.001$; $\chi^2(4)=18.4$, $p=.001$; $\chi^2(4)=13.9$, $p=.009$.

difference by workload strata in the major divisions of time, primarily due to differences in tradeoff of Direct and Nonproductive proportions. When Indirect Care time and Nonproductive time are combined, there is also a statistically significant difference by strata for the remaining nursing staff, although each of the stratum-specific proportions is within 3% of the overall combined proportion of 76.8% (Table 10).

Potential Confounding Variables

Workload information gathered using the Interview Guide at each site indicated that six of the sites had average workloads during the data collection periods, and three sites reported somewhat less than average workload (Forts Rucker, Ord, Leonard Wood). Overall, there was no reason to believe that the observations collected were not representative, nor that they were affected by unusual circumstances. Information was collected regarding support services available to supplement the nursing staff and showed almost a complete absence of nonnursing support services (Appendix J). What little support was available was concentrated within the environmental arena (e.g., cleaning floors, emptying trash).

Table 10.

Impact of combining nonproductive and indirect times
(eliminating students, head nurses, wardmasters, and
ward clerks)

Care category	Percentage of available time by workload strata			
	Overall	Low	Medium	High
Direct	23.22	25.20	20.23	21.61
Indirect and nonproductive	76.78	74.80	79.77	78.39

Note. These differences are statistically significantly different. Chi-square results are: $X^2(2)=11.6$, $p=.003$.

Discussion

Indirect Care Proportion

To answer this study's research questions, several alternative recommendations for indirect care proportions can be proposed for use in a future PACU staffing standard. Using the criteria of accuracy and ease of use, the following approaches are suggested for deriving the desired proportion. First, Available time rather than Total time should be used as the basis of deriving the Indirect Care proportion because this facilitates creation of a staffing standard using the Manpower Availability Factor.

Second, the contribution of the head nurse, wardmaster, and ward clerk should be eliminated from Available time. These three positions would then become directed requirements and be considered fixed fulltime equivalent (FTEs). In other words, the need for these positions is recognized regardless of the variation in workload. The remaining nursing staff requirements (variable FTEs) would be allocated to specific PACU units based upon patient acuity (workload). Currently the WMSN considers the head nurse and wardmaster as directed requirements. Commonly, civilian staffing standards consider all three of these positions to be fixed, with patient care workload requirements determining the number of staff providing direct care.

Third, both the Indirect Care proportion and the Nonproductive proportion should be combined to give a single

"nondirect" care proportion. Recalling Misener et al.'s (1983) study, their Indirect Care proportion actually included a Wait time proportion that is now considered part of Nonproductive time; thus precedent exists for combining these two proportions. Although statistically significant differences exist among PACU workload strata when these two proportions are combined, along with eliminating the above three positions from Available time considerations, the issue of practical significance of these differences must be evaluated. It has already been demonstrated (Appendix F) that a difference of 5% requires 3000 Direct Care hours (associated with a staff of 34) before an additional manpower requirement is earned (.52 FTE). Because few PACU units have workload this high, support is garnered for using a single combined "nondirect" proportion that could be used service-wide, thereby simplifying implementation of the PACU staffing standard. Also, stratum-specific proportions reported in this study are in fact within 3% of the overall recommended combined "nondirect" proportion.

If the above recommendation is not accepted with the Indirect Care proportion and Nonproductive proportion NOT being combined in developing a staffing standard, two options are available. In the first option, separate Indirect Care and Nonproductive proportions for each workload stratum (e.g., low, medium, and high) might be used because of statistically significant differences among these separate proportions by workload. This approach would potentially require manipulation

of six proportions (an Indirect Care proportion and Nonproductive proportion for each stratum) when implementing a PACU staffing standard.

As a second option, weighted Indirect Care and Nonproductive proportions might be constructed based upon the relative mix of high, medium, and low workload sites across the service to adjust for the statistically significant differences in workload strata. This approach would result in the use of two weighted proportions (Indirect Care and Nonproductive) as a minimum for implementing a PACU staffing standard.

Both of these options, involving separate stratum-specific proportion estimates, fail to consider whether the practical significance of the differences requires separate estimates and greater effort in implementing a staffing standard, namely use of three to six staffing proportions. The large number of observations in this study enable even relatively small differences to be statistically significant despite their lack of practical significance.

Nonnursing Activities

As the demand for professional nurses increasingly exceeds the supply, the job content of this professional group has been closely scrutinized. Part of the strategy to expand the supply of nurses has been to have nurses perform those activities that truly require nursing knowledge and to have others perform functions (nonnursing) that do not require nursing knowledge. In

this study, three care categories that are considered nonnursing used the following proportion of PACU nursing staff time based upon Available time: Direct, nonnursing--0.5%, Environmental--4.0%, and Supplies--1.0%. Thus, at least 5.5% of PACU nursing staff time is spent in performing nonnursing functions. In fact, this proportion is undoubtedly higher as many Travel activities (11.39% of Available time) are nonnursing in nature.

Recommendations

1. Using Available time and eliminating three positions (head nurse, wardmaster, and ward clerk), the combined Indirect Care and Nonproductive proportion of 76.8% should be used to develop the PACU staffing standard. This recommendation assumes that sufficient workload is present to require staffing at a higher level than that associated with directed requirements (head nurse, wardmaster or ward clerk).

2. The impact of nonnursing activities on nurse staffing requirements should be further evaluated.

3. Because all required elements are now known, a PACU staffing standard should be immediately developed. Part of this development process should consider basing staffing upon other than mean acuity times. Analysis should be conducted to determine at which acuity level risk management is minimized while productivity is maximized. This analysis is especially

critical in units like PACU in which it is very difficult to move staff from other areas to assist with peaks in workload.

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Appendices

Appendix A

Comparison of Misener et al.'s (1983) Study Definitions with Manpower Regulations

Misener et al.'s Definitions	Manpower Regulations
A. Direct Care Category	
1. Direct Care Activities	1. Equivalent to direct category.
B. Other Activities	
2. Off Unit Activities	3. Partial equivalence to nonavailable category.
3. Personal Activities	4. Equivalent to nonproductive category.
C. Indirect Care Category	
4. Administration Subcategory	5. No exact equivalence. Activities are partially captured by indirect, supervision and indirect, administration categories.
5. Charting, Chart Reference, and Clerical Subcategory	6. No exact equivalence. Per regulations, activities associated with this category would be partially captured by the indirect, administration category and direct category.
6. Communicative Acts Subcategory	7. No equivalent indirect category. Per regulations, time associated with these activities would be measured with direct task.
7. Conference Subcategory	8. Activities partially captured by the indirect, meeting category and direct category.
8. Environmental Subcategory	9. Equivalent to indirect, clean-up category.
9. Preparation of Medication, Supplies, and Equipment Subcategory	10. Partially equivalent to indirect, equipment category; indirect, supply category; and direct category.
10. Travel and Transportation Subcategory	11. No exact equivalence. Activities may be captured with direct category.
11. Wait Subcategory	10. Equivalent to Nonproductive category.

Appendix B

Comparison of Current Study Definitions with Manpower Regulations Definitions

Current Study	Manpower Definitions
A. Direct Care Category	
1. Direct Care, Nursing Subcategory	1. Equivalent to direct category
2. Direct Care, Non-nursing Subcategory	2. As above
B. Other Activities	
3. Unavailable for Care Category	3. Equivalent to nonavailable time
4. Nonproductive (PPD+) Category	4. Equivalent to nonproductive time (subcategory of available time)
C. Indirect Care Category	
5. Administration Subcategory	5. No exact equivalence. Activities partially captured by indirect, supervision and indirect, administration categories.
6. Communication Subcategory	6. No equivalent indirect category. Per regulations, time associated with these activities measured with direct task.
7. Conference Subcategory	7. Activities partially captured by the indirect, meeting category and direct category.
8. Documentation and Clerical Subcategory	8. No exact equivalence. Per regulations, activities associated with this category partially captured by the indirect, administration category and direct category.
9. Environmental Subcategory	9. Equivalent to indirect, clean-up category
10. Patient Support Subcategory	10. No exact equivalence. Per regulations, time associated with these tasks measured with direct task or as part of indirect, equipment category.
11. Supplies Subcategory	11. Equivalent to indirect, supply category and part of direct category.
12. Travel and Transportation Subcategory	10. No exact equivalence. Activities may be captured with direct category.

Appendix C

Comparison of Current Study Definitions with Misener et al.'s (1983) Study Definitions

Current Study	Misener et al.'s Study
A. Direct Care Category	
1. Direct Care, Nursing Subcategory	1. Only partial equivalence. Did not divide direct care, nursing from direct care, non-nursing
2. Direct Care, Non-nursing Subcategory	2. As above.
B. Other Activities	
3. Unavailable for Care Category	3. Partially equivalent to Off Unit Activity Category
4. Nonproductive (PFD+) Category	4. Equivalent to Personal Activity Category and Wait Time Category
C. Indirect Care Category	
5. Administration Subcategory	5. Equivalent to Administration Category
6. Communication Subcategory	6. Equivalent to Communicative Acts Category
7. Conference Subcategory	7. Equivalent to Conferences Category
8. Documentation and Clerical Subcategory	8. Equivalent to Charting, Chart Reference, and Clerical Category
9. Environmental Subcategory	9. Equivalent to Environmental Control Tasks Category
10. Patient Support Subcategory	10. Partially equivalent to Preparation of Medications, Supplies, and Equipment Category; however, it is unknown how central monitoring activities were coded
11. Supplies Subcategory	11. Partially equivalent to Preparation of Medications, Supplies, and Equipment Category
12. Travel and Transportation Subcategory	10. Equivalent to Travel and Transportation Tasks Category

Appendix D

Operational Definitions of Selected Terms

Work Sampling Category Definitions

Direct Care Category: Refers to nursing activities done in the presence of the patient on the unit. The direct care category is divided into two subcategories:

Direct Care Activities, Non-nursing: This subcategory includes all activities done in the presence of a patient associated with obtaining an EKG, collecting specimens (e.g. blood and sputum), and delivering and picking up meal trays.

Direct Care, Nursing: This subcategory includes all activities done in the presence of a patient, except those identified as Direct Care, Non-nursing and those activities associated with transporting a patient.

Other Activities: Refers to when staff are not doing patient care/support or unit management activities for both personal and official reasons. These reasons as defined by regulation are divided into two subcategories:

Unavailable for Care Category: This subcategory includes activities that remove individual from the work center in the following elements: ordinary/annual leave, medical, training (ancillary), organizational duties, PCS/new hire orientation, and miscellaneous. For this study, all staff educational and readiness activities are included in this subcategory.

Nonproductive (PFD+) Category: This subcategory includes all activities related to the nonproductive arena within the available time component. Sample activities include activities of a personal nature (breaks, telephone calls), fatigue, unavoidable delay, wait/stand-by, and meals.

Indirect Care Category: Refers to nursing activities done away from the patient in support of either patient care or unit management. The indirect care category is divided into the following subcategories:

Administration: Includes all activities done in support of unit management. These activities include unit management meetings, time schedule, staff assignment, staff counselling, administrative paperwork, and chart audit.

Communication: Includes all communicative acts related to patient care or unit management. Specific activities include telephone conversations and verbal communications between members of the health care team as well as with family members.

Conference: Includes all types of meetings related to patient care (except those meeting associated with staff education and readiness). Specific activities include change of shift report, medical/nursing rounds, patient care planning conferences, and patient orientation tours.

Documentation and Clerical: Includes all activities related to documentation of patient care and clerical support. Specific activities include documenting patient care,

checking/reading patient records, transcribing/recopying orders, assembling charts, preparing patient-related documents, and filing/restocking forms or reports.

Environmental: Includes all activities related to cleaning on the unit. Specific activities include cleaning and straightening patient room, terminally cleaning the bed, cleaning equipment, cleaning the unit, and emptying trash.

Patient Support: Includes all activities related to providing patient care done away from the patient. Specific activities include preparing, adjusting or breaking down equipment; preparing ordering or inventorying medications; setting or observing central monitoring equipment; handling or testing specimens; and checking emergency equipment.

Supplies: Includes all activities related to supplies and linen control. Specific activities include inventorying, ordering, or restocking supplies or linen.

Travel and Transportation: Includes all activities related to transportation on and off the unit. Specific activities include transport of patients, supplies, medications, equipment or specimens as well as staff travel on the ward

Other Study Definitions

Total time: Includes time components associated with available time and unavailable time.

Available Time: Includes time associated with productive time (direct and indirect activities) as well as nonproductive time (PPD+).

Observation Session: The specific time during which a data collector categorizes nursing staffs' behaviors. This session begins when the data collector starts the random route and observes the first nursing staff's behavior and ends upon categorizing the last nursing staff's behavior for that time period.

Observation Period: Refers to the entire data collection period, the work cycle defined for a specific site.

Random Route: The path that a data collector uses to find and to observe nursing staffs' behaviors. Each observation session starts with a random route, e.g. route that reflects no set pattern or systematic bias.

Appendix E.

Work Sampling Data Collection Form

(one unnumbered page follows)

INDIRECT CARE STUDY

Data sheet id: _____

Site: _____

Observer SSN/initials: _____

Unit type: PACU

Observation date: ____/____/90
mm dd yy

Observation hour: _____

CATEGORY CODES:

.....Indirect codes.....		
1 Direct, nursing	5 Administration	9 Environment
2 Direct, non-nursing	6 Communication	10 Pt. Support
3 Unavailable for care	7 Conference	11 Supplies
4 PFD+	8 Documentation	12 Travel

Nursing Staff		Observation Sessions				Comments [_]	
Type (#)	Name						
____ (1)	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
____ (2)	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
____ (3)	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
____ (4)	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
____ (5)	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
____ (6)	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
____ (7)	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
____ (8)	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
____ (9)	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
____ (10)	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
____ (11)	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
____ (12)	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
____ (13)	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
____ (14)	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
____ (15)	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

NURSING STAFF TYPE CODES:

1 Head Nurse	3 RN	5 Aide equivalent
2 NCOIC	4 LPN equivalent	6 Ward Clerk
7 Student, prof.	8 Student, paraprofessional	

Appendix F

Demonstration of Accuracy Requirement

Assuming 3000 direct care hours, the impact upon staffing using a 5% accuracy level and a .65 Indirect Care proportion (extracted from Misener et al.'s study (1983) is as follows:

1. Lower confidence interval (LCL) = $65.0\% - 2.5\% = 62.5\%$
Upper confidence interval (UCL) = $65.0\% + 2.5\% = 67.5\%$
2. Direct Time + (Direct Time) (%indirect Care)

= Total Available Hours/Manpower Availability Factor

$$\text{LCL} = 3000(1.625) = 4875/145 = 33.62 \text{ Staff}$$

$$3000 (1.65) = 4950/145 = 34.14 \text{ Staff}$$

$$\text{UCL} = 3000(1.675) = 5025/145 = 34.66 \text{ Staff}$$

Based upon the calculation in Step #4, the impact of using 5% accuracy (at the 3000 direct care hour level) is only .52 staff and this occurs only in the extreme cases, e.g. the lower and upper confidence interval distance (34.14-33.62 and 34.66-34.14).

Appendix G

Data Collector Training Agenda

Day One

- I. Introductions 0830-0900
- II. Data collection Procedures, Part I . 0900-1000
 - Break 1000-1015
- III. Data Collection Procedures, Part II . 1015-1130
 - Lunch/business matters 1130-1300
- IV. Paper/Pencil Practical Exercise . . . 1300-1445
 - Break 1445-1500
- V. Video Tape Practical Exercise 1500-1530
- VI. Hospital Site Procedures 1530-1600

Day Two

- I. Travel to Hospital Site 0645-1000
- II. Data Collection Practice 1000-1400
- III. Travel to San Antonio 1400-1700

Day Three

- I. Interrater Reliability Assessment . . 0830-0930
 - Break 0930-0945
- II. Sites Planning 0945-1100
- III. Results Dissemination 1100

Day Four

- Interrater Reliability Retesting 0830+

Appendix H.

Number of Observations by Site, Total Time and Available Time

Observations	Site									Total
	Knox	Rucker	Polk	Ord	Leonard Wood	Benning	Hood	WRAMC	MAMC	
Total no.	564	577	709	598	550	747	954	709	766	6174
% of total time	9.1	9.3	11.5	9.7	8.9	12.1	15.4	11.5	12.4	100.0
Total no. available time	532	561	629	567	520	707	855	694	732	5797
% of available time	9.2	9.7	10.8	9.8	9.0	12.2	14.7	12.0	12.6	100.0

Appendix I.

Percentage of Observations by Time Category within Nursing Staff Type (Including Students), Based on Available Time

Time category	Nursing staff type							Total
	Head nurse	Ward-master	RN	LPN	Nurse Asst	Ward Clerk	Paraprof Student	
Direct, nursing	22.17	14.47	21.78	22.39	22.63	0.0	26.39	21.37
Direct, nonnursing	0.37	0.66	0.41	0.44	0.68	0.0	0.0	0.47
Nonproductive	18.15	20.89	25.28	27.96	25.51	26.19	34.90	24.32
Administration	12.13	26.97	4.75	2.83	3.03	17.86	0.88	7.99
Communication	10.79	6.58	10.32	6.19	2.73	16.67	4.69	7.26
Conference	0.30	0.16	1.86	0.88	0.0	1.19	0.0	0.59
Documentation	18.68	6.41	20.23	12.48	12.26	21.43	14.96	14.80
Environment	12.82	2.47	1.24	4.69	7.87	1.19	5.57	4.04
Patient support	10.27	6.91	6.60	5.66	5.68	1.19	2.64	6.78
Supplies	1.72	1.81	0.31	1.33	1.89	0.0	0.88	1.00
Travel	4.84	12.66	7.22	15.13	17.71	14.29	9.09	11.39

Appendix J.

Degree of Support Available to Nursing Staff from Nonnursing Personnel, by Site

Activity	Low Workload					Medium Workload		High Workload	
	Knox	Rucker	Polk	Ord	Leonard Wood	Benning	Hood	WRAMC	MAMC
Clean floor	Full	Part	Part	Part	Full	Part	Full	Part	Part
Clean bed	Full	None	None	None	Part	None	None	None	Full
Make bed	None	None	None	None	Part	None	None	None	None
Empty trash	Full	Part	Part	Full	None	Part	Full	Full	None
Order supplies	Part	None	Full	None	Full	None	None	Full	None
Restock supplies	None	None	None	Part	None	None	None	None	None
Draw blood ^a	None	None	None	None	None	None	None	None	Part
Collect specimen ^a	None	None	None	None	None	None	None	None	None
Obtain EKG	None	None	None	None	Part	None	None	None	None
Oxygen ^a	None	None	None	None	None	None	None	None	None
Ventilator	Full	Full	None	N/A	Full	None	Full	Part	Part
Meals: to unit ^b	N/A	N/A	Part	None	Full	Part	N/A	Full	Full
Meals: to patient ^b	N/A	N/A	None	None	None	None	N/A	None	None
Transport patients and specimens	None	None	None	None	Part	None	None	None	None

Note. "Part" = nonnursing support available on limited basis. "Full" = nonnursing support available full time.

^aRoutine or Emergency

^bRoutine or Late

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